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Sustaining literacy from Mother Tongue Instruction in Complementary Education into Official Language of Instruction in Government Schools in Ghana

Emma Carter, Ricardo Sabates, Pauline Rose, Kwame Akyeampong

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Abstract:

This paper presents evidence on literacy trajectories for children in Ghana who enrolled in a Complementary Basic Education programme taught in mother tongue and transitioned into government schools. At the point of transition, we find that children who enrolled in government schools where the language of instruction differed from instruction in mother tongue did not perform as well in literacy. After a year in government schools, those taught in another local language caught up. By contrast, those who transitioned into English did not. Our evidence reinforces the benefits of mother tongue and local language instruction for progress in literacy.

Keywords: Mother Tongue; Alternative Education; Out of School; Literacy; Ghana

1. Introduction

Despite considerable progress in access to education globally over the past two decades, millions of children continue to be out of school. It was estimated that around 61 million children were out of primary school globally in 2014 and with the highest proportion estimated to be from countries located in sub-Saharan Africa (UIS, 2016). Educational provision for children who have either never been to school or have dropped out before completing primary school has been a central policy issue for many countries aiming for access to quality basic education for all children. Complementary¹ education programmes have been widely used in many countries to achieve this goal (Ngware et al. 2018).

Two recommendations that are commonly put forward for the successful implementation of complementary education programmes at scale have potentially contradictory implications for language of instruction. First, successful programmes are seen to be driven by the community, using trained local facilitators and local language of instruction to support literacy, numeracy and other skills relevant to the local realities. At the same time, programmes are expected to have strong links with the government education system to ensure effective reintegration into formal schooling (Longden, 2013; Gresham, et al. 2015). Yet the government education system in many multilingual environments is usually taught in the national language, in a reduced number of local languages, or in Western languages such as English or French. This raises an important question: what are the consequences for progression in literacy for children who experience alternative education in local language and then reintegrate into a system which uses a different language of instruction?

The importance of mother tongue education has been highlighted in education research, particularly for African countries (Brock-Utne, 2001, 2010; Trudell, 2009). Trudell (2007)

¹ We focus on provision which is developed as complementary to the educational provision of the government; hence the term complementary education (see Rose, 2009).

suggests that although many parents and communities perceive the importance of national or Western languages, they also acknowledge that local language is central to the maintenance of cultural heritage and therefore many complementary education programmes support the use of mother tongue. Piper, et al. (2016) found benefits of mother tongue education on mother tongue literacy in Kenya, although the authors highlighted that the implementation of mother tongue education was challenging. Further work by Piper et al (2018) found that beyond the benefits on their own mother tongue language literacy, students who were instructed in mother tongue had no additional benefits for learning English or Kiswahili. The authors explained that facilitators did not systematically use mother tongue in the classrooms; an aspect which is different from alternative educational programmes where mother tongue is central to its design and implementation.

Recognising the complexities of the choice of language of instruction highlighted in previous studies, this paper investigates the tension arising from the potentially contradictory implications of the design of complementary basic education programmes. It does so by providing new evidence on the learning trajectories of children instructed in the mother tongue in such a programme in North Ghana, where it was estimated that over 450,000 Ghanaian youth were out of school (Marshall et al., 2016). It compares those who continue with the same language of instruction with those who either transition into a different local language or into English in government schools. For this, it uses data collected as part of an evaluation of the Complementary Basic Education (CBE) programme in Ghana. The CBE programme was initiated by School for Life (SfL) in 1995 and scaled up to incorporate other NGO providers in 2013, with support from the Department for International Development and the United States Agency for International Development (UNESCO/UNICEF, 2012; UNICEF, 2015; Crown Agents, 2018). Similar to other related programmes, the CBE programme provides nine months of instruction in basic literacy and numeracy in 11 mother tongue languages. However, only six of these are used as language of instruction in the government primary school system.

Using data from 1,166 children who enrolled in the CBE programme and then transitioned into government school, foundational literacy skills were assessed during the CBE programme, and then reassessed at the point of transition into government primary schools and again at the end of one school year. While it is reasonable to expect that children who move into a learning environment with the same language of instruction will continue to build upon these basic skills, those who move into a different language of instruction might be expected to make slower progress because of the difficulties in understanding what they are taught. For these children, slow progress in learning could result in dropping out from school (again) (Akyeampong et al., 2007; Bell 2011). Thus, examining the progress that children make in literacy in the transition between complementary and government education systems depending on the language of instruction is important for ensuring that a second chance opportunity to access basic education is not jeopardised because of the challenges of achieving sustainable foundational literacy.

2. Background: The Linguistic Context within Ghana

Debates on the language of instruction in schools has a long history with Ghana, highlighting the complexities in an environment where a large number of languages are spoken, as in many other African countries (Ansah, 2014, Klu & Ansre, 2018; Owu-Ewie, 2013). Though estimates vary, 'Ethnologue' approximates that 79 languages exist across the country, which includes a population of 28 million people distributed over 16 geographic regions (Ansah, 2014; Ethnologue, 2018; Ghana Statistical Services, 2002; Lewis, 2009; Maier, Fage, Davies,

& Boateng, 2019). Despite the multitude of indigenous spoken languages, no indigenous national language exists and language choice in national and non-formal contexts is predominately influenced by social factors. Instead, English, has become Ghana's official language and is commonly used for official and formal communicative purposes. Akan, the largest ethnolinguistic group in Ghana which comprises almost half of the population has also developed as a widely spoken *lingua franca* across the country (Ansah, 2014).

The debate on the language of instruction largely centres around the use of English or local language as the main language of instruction in the early grades of schooling – primary 1 to 3). In addition, for proponents of a bilingual approach, arguments are also made with respect to when and for how long in the education cycle, local language instruction should be used (Ansah, 2014; Klu & Ansre, 2018; Wornyo, 2015).

Within Ghana, bilingual education (denoting English and a relevant local language) began with the establishment of formal education by the European settlers² and subsequently, by Christian missionaries during the pre-colonial era (1529-1925). Whilst the first languages to be applied within formal education were European (Portuguese, Dutch, Danish and English) and dependent upon who was in power at the time, with the arrival of the missionaries, local languages became increasingly used for both educational and religious purposes. As a consequence of missionary efforts, the application of local languages within schools was so well established that by the time the British colonial government overtook the educational administration in 1925, it was powerless to change the status quo (Bamgbose, 2000; Owu-Ewie, 2006). The importance of local language in education at the time was also reinforced in the first legislation on language in education (Owu-Ewie, 2006; MacWilliam, 1969; Graham, 1971; Gbedemah, 1975). This legislation, which was promulgated in 1925, endorsed the use of a Ghanaian language as the main medium of instruction for the initial primary grades (1-3), and a shift to English from grade 4 onwards. This policy, however, was reversed when the country gained independence in 1957.

Since 1957, the language in education policy has been in a constant state of flux (see Ansah, 2014; Klu & Ansre, 2018 for an overview). For example, in August 2002, a policy shift stipulating English as the main language of instruction from primary grade 1, with a Ghanaian language studied alongside this as a compulsory subject until Senior Secondary School was approved. This change intensified debate over language of instruction and its benefits, resulting in a subsequent reversion by the New Patriotic Party (NPP) government in September 2007 back to the use of local language as the primary medium of instruction for the early years of schooling, followed by English from primary grade 4 onwards. This policy, which remains currently in place, reflects previous bilingual models used within Ghana, albeit with some important changes, including incorporation of pre-schoolers in its guidelines, as well as the option of a Ghanaian language in the early years of primary or English, where needed (Ansah, 2014).

2.1 Current Language of Instruction in Ghanaian Education Policy

The current language of instruction in Ghana aims to respond to previous challenges by focusing on local languages as the main language of instruction in lower primary school (grades 1-3). However, it only covers 11 of around 80 local languages. At the upper primary

² The establishment of formal schools was through 'Castle schools' which were those established by European settlers at their forts. These schools provided education to children of European castle staff as well as those related to affluent African merchants and chiefs (Ansah, 2014; Wornyo, 2015).

level, these local languages are studied as a subject alongside English which becomes the medium of instruction.

Even though the current policy espouses the advantages of mother tongue instruction as a rationale for its use of local languages at the earliest levels of schooling, this is far from the reality on the ground (Klu & Ansre, 2018). For example, local languages currently used in schools represent ‘dominant’ languages within Ghana, meaning that many children, particularly those from minority ethnic groups in the North part of the country cannot speak or have little to no exposure to the language. The language policy, therefore, is seen by some as discriminatory as it forces children from minority groups who speak languages not catered for by the legislation to take on another language as their ‘mother tongue’ (Ansah, 2014). A further issue is that even for those children who can access their mother tongue through the curriculum, the teachers themselves are often unable to teach it or use it effectively in teaching. For example, even if a teacher has the ability to speak the language, this does not necessarily mean they have the competence to teach it in different subjects, such as science or mathematics. Finally, access to quality teaching resources in local languages of instruction also remains an ongoing challenge (Klu & Ansre, 2018).

An additional issue concerns the definition and identification of a child’s mother tongue in a complex multilingual environment such as Ghana. For example, Jespersen’s (1922) definition of mother tongue as the first language in which the child is able to communicate, rather than their mother’s language, may be straightforward to follow. Determining this, however, is extraordinarily complex in multilingual and multi-ethnic contexts. Ansah (2014, p. 7) poses a critical question to illustrate this challenge:

What is the mother tongue of a Ghanaian child of Ewe-speaking parentage, who lives in an Akan speaking community in Accra but attends an English only medium private school in a predominantly Ga-speaking neighbourhood, and speaks all four languages fluently from an early age?

Such profiles are not infrequent within Ghana and language diversity, particularly in urban and peri-urban settings has been described as the norm, rather than the exception (Klu & Ansre, 2018, p. 600).

2.2 Mother Tongue-Based Education

Research suggests that for mother tongue education to be most effective and beneficial to second language acquisition, it should be implemented for at least 3 years, a goal that is often not feasible in multilingual contexts such as Ghana (Ansah, 2014; Cummins, 1979, 2000; Akyeampong 2004). Cummin’s (1984, 1991) Interdependence Theory asserts that the skills and concepts learnt in the first language can be applied to a second language and impact the rate and level of progress of a second language. In other words, the more established one’s first language abilities are, the more rapid and comprehensive the acquisition of the second language will be. A report commissioned by UNESCO (Bell, 2011) on mother tongue based multilingual education suggests that complementary education in mother tongue language could affect the proficiency of children in all languages if children are not already highly proficient in their first language before transitioning to their next. Of particular relevance to the focus of our paper, the author states:

If children are forced to switch abruptly or transition too soon from learning in their mother tongue to schooling in a second language, their first language acquisition may be attenuated or even lost. Even more importantly, their self-confidence as learners and

their interest in what they are learning may decline, leading to lack of motivation, school failure, and early school leaving. (Bell, 2011, p. 6)

Related to this, a crucial issue which has not received much attention in the literature on language of instruction is whether early gains in literacy proficiency can be sustained when children are instructed in their mother tongue initially and then transition into schools using a different local language as opposed to a Western language, such as English. In a country like Ghana, given that many children are likely to transition into schools where their mother tongue is not the lingua-franca this is an important policy issue – does mother-tongue instruction in early primary education in a multi-lingual environment provide benefits in subsequent language literacy achievement in another local language?

2.3 Study Objective

In light of the aforementioned complexities relating to language of instruction, this study aims to examine the consequences on literacy acquisition for children who complete complementary education in their mother tongue and move into a different language of instruction in government schools in Ghana. As noted, in Ghana, selected local languages are the primary medium of instruction for children up to primary grade 3 and English is the primary medium of instruction from primary grade 4 onward (with a local language being studied as a subject alongside English at this level). Therefore, we identify four different scenarios which describe continuities or discontinuities of mother tongue education for children who completed the CBE programme:

1a. Continuity: children who move into primary grade 3 or below and into instructional environments where the same local language as CBE is retained as the dominant language.

1b. Discontinuity: children who move into primary grade 3 or below and into instructional environments where a different local language to CBE is used as the dominant language.

2a. Continuity: children who are placed in primary grade 4 or above and shift into an English dominated instructional environment where the same local language as CBE is studied as a subject.

2b. Discontinuity: children who are placed in primary grade 4 or above where English becomes the dominant language of instruction and a different local language to that of CBE is studied as a subject.

This study examines whether local language literacy is affected under each of the above four scenarios. Specifically, we aim to test empirically the following three hypotheses:

1. At the point of transition, children who have discontinuities in their mother tongue education will show poorer local language literacy skills (scenarios 1b. & 2b. relative to 1a. & 2a.).
2. Children who transition into a different local language of instruction in primary grade 3 or below may be able to catch up in local language literacy while in government schools (scenario 1b. relative to 1a.).
3. Children who transition into primary grade 4 or above, where English is the language of instruction, experience detrimental impact on their local language learning (scenario 2b relative to 2a.).

3. Methodology

3.1 Estimation sample

Children who took part in the CBE programme in the 2016/2017 academic year were tracked longitudinally over two years. During this time, four rounds of learning assessments were collected, capturing basic literacy and numeracy together with survey data, for example, on children's background characteristics. The four rounds included: the beginning of CBE programme in October 2016; the end of the CBE in June 2017; for those (re-)entering government school, the start of government school in October 2017; and, the end of the first year of government school in June 2018.

The initial sample of students was 2,360, drawn from an approximate 40,000 CBE children who took part in the 2016/2017 academic year. The sample of students was selected using stratified random sampling which provided proportional representation by gender, local language, region, district and provider of the CBE programme. Given our interest in tracking those CBE students who continue to government schooling, the analysis that follows only includes this sub-set of children. The sample is therefore reduced as it does not take into account children who do not continue to government schools, those who dropout from government schools, those who migrated or who were absent at the time of data collection (irregular attendance is high due to seasonality and household chores). From the initial sample, data with full information on all time points is available for 1,166 children, which forms the basis of the estimation sample for this paper.

Attrition bias could affect our results in the following two ways: first, low performing children may be less likely to continue to government schooling or stay in once there, therefore our sample may be biased towards children who are more likely to be high performers. Secondly, and more importantly for our analysis, children who change language of instruction could have a higher risk of dropping out. Hence, if attrition is higher for these children, then any differences between children who change language of instruction and those who do not are likely to be an underestimate of the true difference. This obviously posits a challenge.

In order to assess attrition bias, **Error! Reference source not found.** presents descriptive statistics of key socioeconomic and demographic variables as well as initial learning for the full sample of children included at the start of the CBE programme, together with children who dropped out from the study at each round of data collection (389 were missing at the end of the CBE programme, 1,055 at the start of public school and 1,084 at the end of the first year in public school). It is important not to equate the high rate of attrition at the beginning of public school with student drop-out/discontinuation of learning. This occurrence is due to two main reasons: 1) CBE often involves children from migrant communities in Northern region of Ghana, resulting in enumerators being unable to locate many students following completion of the programme due to the changing population; and 2) the greater monitoring intensity of CBE students by enumerators during formal school, compared to during CBE and in their transition formal, meaning that more students were able to be tracked in the latter phase of data collection. The final column presents key socioeconomic, demographic and educational related information available at the start of the CBE programme for our estimation sample (1,166 children).³

³ For variables reporting averages (e.g. missed days at school, age, household size) t-tests were conducted to determine differences between the estimation sample and all other reported samples (full sample and attrition samples over time). For all other variables, separate chi square tests were conducted to determine differences

==Table 1 about here==

The proportion of female students at the beginning of the CBE programme was 46.9% whereas for our estimation sample it is 49.2% (see **Error! Reference source not found.**). Therefore, a higher proportion of girls remained in our estimation sample. This is primarily due to more girls making the transition to government school, and the smaller proportion of girls who dropped out.

Using the full sample, we estimate that 52% of children made the transition into the same language of instruction following the completion of the CBE programme. By comparison, the estimation sample contains 53.6% of children who made the transition into the same language. We did not find evidence to suggest that there are differences in the proportion of children who made the transition into the same language between our estimation sample and the rest of the attrition subsamples. This result suggests that children who would, or did, change languages in government school did not pose a higher risk of being unavailable in the sample.

Regarding academic achievement, we found 14% of children were not able to answer any questions correctly in the literacy test (referred to as ‘non-performers’) at the start of the CBE programme. In our estimation sample, only 10.4% of children were non-performers in literacy at the start of the CBE programme. Our estimation sample contains statistically significant smaller proportions of non-performers in literacy (overall scores as well as letter sound identification and reading comprehension subtask scores) compared with the original sample as well as attrition samples at different periods. Similar results were found for numeracy. Therefore, this evidence suggests that our estimation sample contains children who were more likely to be high performers in both literacy and numeracy.

Overall, we can conclude that our estimation sample contains a larger proportion of children who are high performers, missed fewer school days, and engage more with learning activities at home compared with the full sample. Importantly, though, there are no differences in the proportion of children who made a transition to a different language of instruction after completing the CBE programme, an issue which could have affected the analysis. We therefore conclude that attrition is unlikely to bias our results, while recognising that our findings are more representative of higher performing children.

3.2 Transition language and grade placement in government school

Table 2 shows the total number of children who transitioned into the same or different CBE language in government school following completion of the CBE programme and specifies the language of instruction. Whilst CBE was conducted in 11 local languages, only 6 of these were used as a language of instruction within the government system. These included Dagaare, Dagbani, Ewe, Gonja, Asante Twi and Kasem. Table 2 further shows that proportionally, children who transitioned into another language were placed in lower grades of primary school (grades 2 and 3), whereas children who move into same language of instruction were more likely to be placed at higher grades of primary school (grades 4 and

between the frequencies of students in the estimation sample and those in all other reported samples. Statistical significance is reported at $p < 0.05$.

above). This finding suggests that transitions into the same language of instruction may have influenced placement of students into higher grades of schooling.⁴

==Table 2 about here==

3.3 Main Outcome: Literacy Assessments

The key outcome variable for this study is a measure of basic literacy skills. The learning assessments used for the four rounds of data collection were based on the Early Grade Reading Assessment (EGRA) for local language literacy. EGRA instruments in Ghana were developed in 2013 in eleven local languages and English. They were designed to provide information about basic reading and writing competencies — those competencies that should typically be mastered in the very early grades of primary school, without which pupils are likely to struggle to continue to achieve higher academic competencies.

The assessments administered during the CBE programme (rounds 1 and 2 of data collection) were different from the standard EGRA instruments, which were used during the government school (rounds 3 and 4 of data collection). The assessments administered during the CBE programme were modified by the Directorate of Research Innovation and Consultancy (DRIC) of the University of Cape Coast in Ghana, to reflect the specific literacy competencies learners were expected to acquire in the CBE programme⁵. In addition, translations of assessments were carried out in six local languages for which standard EGRA instruments were unavailable. These languages included: Brifo, Gurune, Kusaal, Likpakpaln, Mampruli and Sissala. Due to these adaptations, the assessments used during the CBE phase of data collection contained a few key differences from the standard EGRA design used in the latter phase of data collection. These included differences in the number of items in each task as well as the subtask constitution of the instrument. These differences, including the number of assessment items (in brackets), are shown in Table 3.⁶

==Table 3 about here==

Due to minor differences between the subtask constitution of instruments used in the first and second year of data collection, only some items could be selected for comparison over time. As a result, those included in the analysis that follows are letter sound identification and reading comprehension as subtasks for literacy. The use of both of these two subtasks for

⁴ In respect to age, no statistically significant differences were observed between students who entered into Grade 4 and above in a same language (age 11.3±1.8) and different language (age 11.4±2.2). This was also the case for students who entered school in Grades 3 and below in a same (age 10.0±1.8) or different (age 10.2±2.0) language. Therefore, though age may play some role in the general grade placement of students in Grades 3 and below and Grades 4 and above (given the average year age difference between these overall categories) it does not appear to be a factor that differentiates language same and language other groups at these levels of schooling.

⁵ DRIC held consultations with the Ghana Education Service's National Assessment Unit to ensure agreement on the proposed modifications to the standard EGRA/EGMA tools. For quality assurance purposes, the translation of the various assessment items into the different mother tongue languages was done following a test and item specification provided to translators by DRIC. See DRIC/UCC (2016), *Complementary Basic Education (CBE) Learners Assessment: Baseline Report for 2015/2016* for a full account of the process of developing the original instruments.

⁶ There were complications in the data entry for the passage involving the reading task, which meant that no data could be reported for oral reading fluency (one of the standard EGRA subtasks) during the CBE programme.

empirical purposes is important. Letter sound identification is a more rudimentary, recall based task which captures the foundations of literacy whereas reading comprehension is a more sophisticated skill requiring inferential understanding of text.

In addition, there were also minor differences such as the number of items used in each subtask during the first and second year of data collection. This means that although the subtasks of letter sound identification and reading comprehension do measure the same underlying skills, the measurement on the proficiency level achieved by children in each of these subtasks is not directly comparable over time. Because of this, it was decided that zero scores would provide the most accurate measurement of progress over time, as opposed to mean scores on subtasks. Zero scores show the proportion of students who could not correctly answer a single item on a given subtask and therefore reveals the number of students performing at critically low levels.

3.4 Child Background Questionnaire

A child background survey was administered to CBE children at all four stages of data collection. The child survey collected information related to participants' demographics, family status, household economic situation, school, language backgrounds, work history, and personal opinions about school and learning. It was designed to permit the analysis of patterns of differences in performance linked to the students' background and in particular, this information is key to investigating whether such variables are associated with literacy skills over time. Key child and household characteristics included age, gender, household size and whether or not children had access to home literacy materials (e.g. books), engaged in home literacy and numeracy activity (namely reading and writing; and counting or measuring),⁷ and worked outside of home. In addition, children's recent attendance at school⁸ was included as a covariate, as was children's relative wealth status that was constructed using Principal Component Analysis, following Filmer and Pritchett's (2001) methodology.⁹ Descriptive statistics for these variables for the estimation sample have been shown in **Error!** Reference source not found..

3.5 Analytical Approach

A two-stage quantitative approach to analysing basic literacy achievements over time is used in this paper. Stage 1 involves examining descriptively students' progress in literacy assessments at each stage of data collection. Specifically, we plot the proportion of zero scores from the beginning of the CBE programme to the end of the first year of government school for children, and disaggregate results by those children who had access to their CBE language and therefore mother tongue in government school (referred to as the 'language same' group) and those that did not (referred to as the 'language other' group) as well as by

⁷ Information regarding this variable was not collected at the start of CBE, but at the start of government school. For this reason, it has not been included in the attrition analysis in Table 1.

⁸ As determined through the question: Think about the last five school days, how many days have you missed school?

⁹ The wealth index is based on data derived from the Child Background Questionnaire. Responses to the household economic questions were used to create an index as a proxy for socio-economic status. Following Filmer & Pritchett's (2001) methodology, this was achieved through using tetrachoric correlations for all binary variables (such as mobile phone ownership, whether their house has a bicycle, motorbike, radio, television, source of light in the night, and having enough food) and then split into quartiles by district. These were then used to help differentiate among students who were relatively richer and relatively poorer than others in the sample. Whilst collecting reliable data related to household wealth is a difficult exercise, particularly in Southern contexts, robustness checks were carried out through comparisons between child and parental reported data. Due to the overall similarity of findings, child reported data was used to construct the index applied within this study.

the grade of placement (primary grade 3 and below and primary grade 4 and above).

In order to establish if there are statistically significant differences at each point in time in the plotted trajectories, and to account for confounding variables that could potentially mask these differences, we use difference-in-difference (DID) estimation techniques with the inclusion of control variables. Formally, changes in literacy, during the estimation periods (for example from the start to the end of the CBE programme), for children who transitioned into a different language and those who did not, is modelled using the following equation:

$$L_{it} = \beta_0 + \beta_1 TR_i + \beta_2 Time + \beta_3 TR_i | Time + \gamma X_{it} + e_{it}$$

where L is a measure of literacy (subtasks) for child i in time t ; TR is a dummy variable equal to one for children who transitioned into same language; $Time$ is a dummy variable to indicate the pre and post time period; and $TR|Time$ is the interaction term which denotes the relative difference between children who transitioned into same and different language before and after the time period. The β parameters indicate: β_1 is the difference in literacy (L) at the start of the reference period between children who transition into same or a different language; β_2 is the average change in literacy (L) over the reference period for children who transitioned into a different language of instruction, and β_3 is the relative difference in literacy (L) over time, i.e. the difference-in-difference parameter. The matrix \mathbf{X} contains child and household characteristics.

The key periods to be analysed empirically here are:

- Start to end of CBE: To mark whether there are differences in literacy gains during the CBE programme between children who later transition into a different language and those who do not. This helps to establish the comparability of the groups prior to the transition.
- End of CBE to start of government school: To mark whether there are differences in literacy as children make the transition into government schools. This helps to test hypothesis 1.
- Start to the end of the first year of government school: To mark whether there are differences in literacy gains after one year in government schools between children who transitioned into a different language of instruction and those who did not. This helps to test hypotheses 2 and 3.

Since the outcome variable is a binary measure of whether students are able to perform any item on the literacy subtasks, we utilise a Linear Probability Model (LPM) for the estimation of parameters (Cerulli, 2015). LPM was chosen instead of a logit modelling approach due to its greater stability in estimating relative differences between CBE children who transitioned into the same and different local language.¹⁰ As underscored by Alcott & Rose (2018), there is strong evidence supporting the comparability of LPM and logistic regression in respect to the accuracy of predictions (see Ai & Norton, 2003; Norton et al., 2004). LPM is also often preferred due to its ease of interpretability, particularly in regard to interaction terms, which constitute an essential element of our analysis (Alcott & Rose, 2018).

¹⁰ Logistical modelling proved to be an unstable estimation approach, notably in cases where low cell frequencies arose in models estimating differences in children Grades 4 and above. In such cases, implausibly large coefficients and odds ratios for predictor variables occurred and could not be readily interpreted.

Estimated parameters are corrected for what is known as the multiple hypotheses testing using the Benjamini-Hochberg (1995) method. This correction takes into consideration the fact that children have been exposed to several rounds of testing and over time it is possible that they build some expertise in responding to the test. The multi-stage sampling of our data is accounted for by using robust standard errors for all models. This addresses the issue of heteroscedasticity caused by clustering. Finally, estimated parameters are obtained for the overall estimation sample, but particularly important, are those for the subsamples by grade of placement (i.e. primary grades 3 and below and primary grade 4 and above).

4. Results

4.1 Progress in Literacy Over Time

Figure 1 and

Figure 2 show the proportion of children who could not answer a single item on the literacy assessments of letter sound identification and reading comprehension across four time periods, by language of transition and grade of placement. The potential learning consequences of changing language of instruction upon transition into government school shown in these figures is summarised as follows: First, learning progress in literacy subtasks during the CBE programme is relatively similar for all children; though, as expected, those who transitioned into primary grade 3 and below have a higher proportion of non-performers in literacy compared with those who transitioned into primary grade 4 and above. Secondly, the proportion of non-performers is higher at the start of government school for those who transitioned into a different language regardless of the grade of placement. However, this gap is higher for students who transitioned into primary grade 4 and above. Finally, for children placed into grade 3 or below, the proportion of non-performers reduces by the end of government schooling regardless of whether they transition into a non-CBE/different language; for grade 4 and above, however, a wide gap appears by end of the government school cycle. This issue is further explored in DID estimation to follow.

==Figure 1 & 2 about here==

4.3 Statistical Analyses: Difference-in-Difference

The main aim of this section is to establish the statistical significance of the observed learning trajectories presented above. Table 4 presents results from the estimated parameters of absolute and relative changes in literacy subtasks between children who moved into the same language of instruction and those who moved into a different language of instruction. As indicated in the methodology, analyses are presented for the three key educational periods experienced by these children: from the start to the end of the CBE programme to test the comparability of the groups; for the transition from the end of the CBE programme into public schools to test hypothesis 1 and finally during the first year in public schools to test hypotheses 2 and 3. Results are presented for the overall sample as well as for subsamples by grade of placement. For each set of results, three parameters are presented. *Initial difference* refers to the difference between language same and language different student subgroups at the beginning of the time period in question; *average change* refers to the average change in zero score proportions for each time period in question; *relative change* represents the DID parameter, i.e. the interaction term that denotes the relative difference between students who transitioned into the same and different language for each time period in question.

==Table 4 about here==

Beginning to end of CBE: Comparability of literacy learning between groups during the CBE programme

Before testing the hypotheses for literacy trajectories as children change language of instruction, we assess the comparability between groups during the CBE programme. Consistent with the observed trajectories presented above, there are largely statistically insignificant differences in initial assessments at the start of the CBE programme between children who would later move into the same language of instruction and those who would move into a different language for the overall sample of children. This is indicated in Models (1) and (2) for literacy in Table 4 where estimated parameters for the ‘initial difference’ at the start of the CBE programme are not statistically significant. Subgroup analyses by grade of placement indicate that children who would later transition into the same language group had

a slightly higher proportion of zero scores (non-performers) at the start of CBE in reading comprehension (if they later transition into grade 3 and below).

Overall, results demonstrate that there are statistically significant reductions in the proportion of zero scores (non-performers) in literacy subtasks over the CBE programme for children who subsequently transition into a different language. This result is consistent regardless of grade of placement. As such, it appears that the CBE programme does improve literacy. For example, Model 1 in Table 4, for the estimation sample, showed that the average reduction in the proportion of zeros in letter sound identification over the CBE programme was 10 percentage points for those children. This result is even more pronounced for reading comprehension (32 percentage points). Finally, no statistically significant differences in literacy during the CBE programme between children who later transition into the same or a different language were found (as indicated by the statistically non-significant estimated DID parameters for ‘relative change’) by grade of placement. The only exception was the statistically significant result found for the estimation sample for letter sound identification. Here, the relative reduction in non-performers was larger for children who transitioned into a different language. In general, these results provide evidence of the similar academic performance achieved by children over the course of the CBE programme.

Hypothesis 1: Local language skills at the point of transition into government school

The first hypothesis states that at the point of transition, children who have discontinuities in their mother tongue education will show poorer local language literacy skills. Models (3) and (4) in Table 4 show results from the estimated changes in literacy subtasks for the transition period. Overall, the proportion of non-performers increased, on average, during the transition – but this average increase was much less pronounced for children who moved into the same language. For instance, the DID estimate (relative change) demonstrates that children who transitioned into the same language were 33 percentage points less likely to achieve zero scores in letter sound identification (Model (3) in Table 4) and 37 percentage points less likely to achieve zero scores in reading comprehension relative to those who transitioned into a different language (Model (4) in Table 4).

This result is consistent regardless of the grade of placement. Using results from reading comprehension, for example, children who transitioned into same language and were placed in grades 3 and below were only 22 percentage points less likely to achieve zero scores in reading comprehension relative to those who transitioned into a different language. Similarly, those who transitioned into primary grade 4 and above, when English becomes the language of instruction, were 53 percentage points less likely to achieve zero scores in this subtask relative to those who transitioned into a different language (Model (4) in Table 4). Overall, these findings suggest that this hypothesis is not rejected.

Hypotheses 2 & 3: Relative improvements in local language during government school by grade of placement

The second hypothesis proposes that children who transition into a different local language of instruction in primary grade 3 or below may be able to catch up in local language literacy while in government schools. Focusing on the results for grade 3 and below (Models (5) and (6) in Table 4), we find that all children improved in literacy, as indicated by the estimated parameters for the average reductions in zero scores in both letter sound identification and reading comprehension. The DID parameters indicate that children who transitioned into a different language had greater reductions in the proportion of zero scores for letter sound identification and similar progress in reading comprehension relative to children who transitioned into the same language. As shown in Figure 1, at the end of the first year in

government school, children who transitioned into a different language managed to catch up in these two foundational literacy subtasks relative to children who transitioned into the same language. These results are consistent with the second hypothesis.

The third hypothesis suggests that children who transition into primary grade 4 or above, where English is the language of instruction, experience detrimental impact on their local language learning. Focusing now on the results for grade 4 and above (also in Models (5) and (6) in Table 4), we also find that children improved, on average, on letter sound identification (reductions in zero scores by 10 percentage points) and reading comprehension (reductions in zero scores by 46 percentage points). The DID parameters indicate that children who transitioned into schools where the local language taught as a subject was different from their mother tongue had similar reductions in letter sound identification and greater reductions in reading comprehension relative to children who transitioned into schools where the Ghanaian language taught was their local language. Still, as shown in Figure 2, at the end of the first year in government school there are higher proportions of zero scores in letter identification and in reading comprehension for children who transitioned into schools where the local language was different from their mother tongue. Overall, taking into account the size of the initial loss at the point of transition and the gap in the proportion of non-performers which remains at the end of the first year of formal school, one could argue that there is evidence in favour of this hypothesis. However, there is also some evidence which suggests the potential to catch up, at least in reading comprehension, which is against the third hypothesis.

5. Discussion and conclusion

This study investigated the impact of transitions from mother tongue learning environments on learning progress into local language (in lower primary school grades) or English (in upper grades) for Ghanaian children who undertook Complementary Basic Education programme during the 2016/2017 academic year.

The first hypothesis of this paper suggests that at the start of government school children who moved into a different local language following CBE were likely to show poorer literacy skills in the new local language compared with children who are able to benefit from a continuation of their mother tongue education. Our results confirm this hypothesis by demonstrating that children who transitioned into a different language of instruction had worse performance in literacy at the start of government school, just after making the transition from the ten-month complementary education programme. This loss seems to be greater for reading comprehension for children who transitioned into grades 4 and above, where English is the medium of instruction and the local language is taught as a subject. It would appear that in transitioning to a classroom environment where English is the official language, children suffer a greater set-back perhaps because of the challenges of adapting to the new languages.

The second hypothesis suggests that children should be able to catch up in foundational local language literacy skills during their first year in government schools particularly those where local language is still the medium of instruction. Our results show that children who transitioned into primary grades 3 and below, where local language is still the main medium of instruction, managed to catch up in letter and sound identification and had similar rates of progress for reading comprehension relative to children who transitioned into the same language. This is an indication of the value of continuity with the mother tongue after the transition into government schools. What this seems to suggest is that, children who

transition into a different language of instruction and at the start of government schools are likely to perform poorly, but make enough progress to reach similar levels of achievement with those who continue with the same language of instruction used in the complementary education programme. Cummins (1984, 1991) hypothesis, which indicates that the child's mother tongue must be sufficiently developed before learning in a second language can effectively occur, seems to be borne out by this result. We would argue that because these children had been taught exclusively in the mother tongue for almost a year, this had helped to sustain their literacy competence after a further year in government schools where the language of instruction is different. In other words, children who moved into a different local language of instruction managed to catch up, which may suggest that they had developed enough literacy proficiency in their mother tongue, before the transition into government schools where a different local language is used. It is important to highlight, however that our results cannot be generalised to higher proficiency levels in literacy as we only measured foundational skills.

The final hypothesis was proposed in terms of the potential detrimental impact of local language learning for children who transitioned into higher grades of primary school, where English becomes the language of instruction and local language is taught only as a subject. In such a scenario, children who transition into schools where the medium of instruction is English (i.e. grade 4) and a Ghanaian language taught is a local language different from their mother tongue somehow managed to close the achievement gap in reading comprehension. However, an average achievement gap in letter and sound identification and in reading comprehension remained at the end of the first year in government schools between children who moved into schools where a Ghanaian language taught was their local language relative to a different local language from their mother tongue. We would argue that limited instructional time in the new local language, as well as a shift into English as the dominant language of instruction is a plausible explanation of this result.

Like the CBE programme in Ghana, several complementary education programmes have been set up across sub-Saharan Africa (e.g. CBE in Tanzania and Malawi, the Basic Education for Urban Poverty Areas in Uganda, the Programme for Literacy and School Acceleration in Angola, Speed Schools in Burkina Faso and Ethiopia, among others –see Power 2014 for further information). These programmes share similar key characteristics including their small classes, locally trained facilitators, an accelerated and targeted pedagogy and, of course, local language of instruction. Many children who undertake these programmes are likely to transit into a different language of instruction once in the government school system. Therefore, our findings could have important implications for these programmes too. Notably, we conclude that initial exposure to the mother tongue as the medium of instruction ultimately pays dividends provided children are able to transition into another local language that is similarly prioritised within the classroom, even if initially it leads to loss of progress in literacy in the early transition phase. As such, overall, our evidence suggests that serious attention should be given to instructing children using the mother tongue as proficiency here improves the chances of children sustaining gains in literacy proficiency in multilingual learning environments in the government school system, even if initially they experience some difficulties at the point of transition.

There are important implications of our findings for policy to improve access to basic education for marginalised out of school children seeking re-entry into the government school system. For many of these children who have earlier on failed to acquire basic literacy competency, offering a second chance through an accelerated complementary basic education programme, should be through mother tongue instruction. This should be the first

step in dismantling the barriers that prevented them from accessing quality education in the first place. Secondly, our findings suggest that the grade at which they make their transition into the government school system matters if the ‘boost’ in local language competency is to yield positive dividends in terms of sustaining literacy gains. In other words, placement decision is key to sustaining progress in literacy. So, if graduates of the accelerated CBE are to be placed in early primary grades in government schools, this should be in schools where their mother tongue is still used as the language of instruction. Failing that, placement should be in a school where a different local language is used. Placing them in an English medium of instruction environment is likely to erode the literacy gains made through the mother-tongue accelerated learning programme. If children are placed in higher grades (e.g. grade 4) where English is the language of instruction there is a bigger risk to their progress. Higher grade teachers need awareness and skills training to ensure that CBE graduates are given extra support to facilitate learning in an English medium of instruction environment.

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Table 1: Descriptive statistics of full and estimation sample as well as attrition samples at different rounds of data

	Full Sample Start of CBE	Attrition from sample			Estimation Sample
		End of CBE	Start of Government School	End of Government School (Yr1)	
No. Available	2360	1971	1305	1276	1166
No. Unavailable	NA	389	1055	1084	NA
% Attrition	NA	16.5	44.7	45.9	NA
Sample for descriptive statistics	2360	389	1055	1084	1166
% Female	47	49.1	43.9	44.4	49.2
% Language same transition at government school (*)	52	51.5	50	49.6	53.6
% Zeros-overall literacy score	14	21.1	17.1	17.3	10.4
% Zeros-Letter sound	16.8	25.5	20.0	20.2	12.7
%Zeros-Reading comprehension	66.5	73.3	71.3	71.2	61.9
% Zeros- overall numeracy score	6.3	8.8	7.3	7.6	5.1
%With learning materials (e.g. books) at home	81.6	80.7	82.4	82.4	81.4
% Engaging in reading activity at home	71.2	68.6	68.6	68.6	73.8
% Work outside of home	47	47.8	48.5	48.6	46.1
Average missed days at school (**)	0.9(1.2)	1.1(1.2)	1.1(1.2)	1.1(1.2)	0.8 (1.1)
Average age	10.1(2.2)	10.3(2.2)	10.2(2.2)	10.2(2.2)	10.2(2.1)
Average household size	10.1(6.0)	9.9(5.7)	10.3(6.2)	10.3(6.2)	10.1(6.0)
% Low wealth	27.4	25.1	27.8	28.0	27.1
%Mid low wealth	25.8	27.5	26.7	26.4	25.2
% Mid high wealth	24.3	26.7	24.4	24.8	24
% High wealth	22.5	20.7	21.1	20.8	23.74

Source: Authors' calculations based on CBE Monitoring and Evaluation 2016-2018.

Notes: Standard deviations shown in parentheses.

(*) Proportions are based on those children whose CBE's centres could be traced to a later language of instruction in government school. Based upon data at the start of CBE, 4.62% of children learnt in centres from which all pupils did not make the transition into government schools. Because on this issue, data could not be imputed for 6 centres (110 children) involved in Round 1 of data collection. (**) This figure represents the average number of days missed in the five days preceding data collection. It was determined by the question: *In the last five days of school, how many days have you missed school?*

Table 2: Number of children transitioning from CBE to government school, by language of transition

Language of Transition (Same)	Frequency	Grade 3 and below %	Grade 4 and above %
Dagaare → Dagaare	87	33.3	66.7
Dagbani → Dagbani	278	29.5	70.5
Ewe → Ewe	42	45.2	54.8
Gonja → Gonja	89	48.3	51.7
Asante-Twi → Asante-Twi	95	20	80
Kasem → Kasem	34	17.6	82.4
Total	625	31.7%	68.3%

Language of Transition (Different)	Frequency	Grade 3 and below %	Grade 4 and above %
Brifo → Dagaare	149	69.8	30.2
Dagaare → Asante-Twi	1	100	0
Dagaare → Dagbani	2	50	50
Dagaare → Ewe	2	50	50
Dagaare → Kasem	1	100	0
Gurune → Dagaare	45	20	80
Kusaal → Kasem	94	25.5	74.5
Likpakpaln → Dagbani	136	68.4	31.6
Mampruli → Dagbani	86	55.8	44.2
Sissala → Dagaare	25	24	76
Total	541	53.2%	46.8%

Source: Authors' calculations based on CBE Monitoring and Evaluation 2016-2018.

Table 3: Differences in test instruments between modified and standard EGRA

Modified EGRA Instrument (Start and end of CBE)	Standard EGRA Instrument (Start and end of first year of government school)
Letter/sound identification (50)	Letter/sound identification (100)
Phonemic awareness (10)	Non-word reading (50)
Reading comprehension (4)	Reading comprehension (5)
Oral passage reading fluency*	Oral passage reading fluency (64)**
Familiar word identification (20)	Listening comprehension (3)
Word writing (5)	
Creative writing/sentence formation (2)	

Notes: *This subtask was scored for accuracy as the total number of words read correctly in one minute

**The number of items for this subtask was dependent upon the language of assessment. 64 represents the maximum number of words tested.

Source: CBE Monitoring and Evaluation 2016-2018.

Table 4: Parameter estimate and (standard error) for modelling literacy changes across two time periods, DID models, by grade of placement

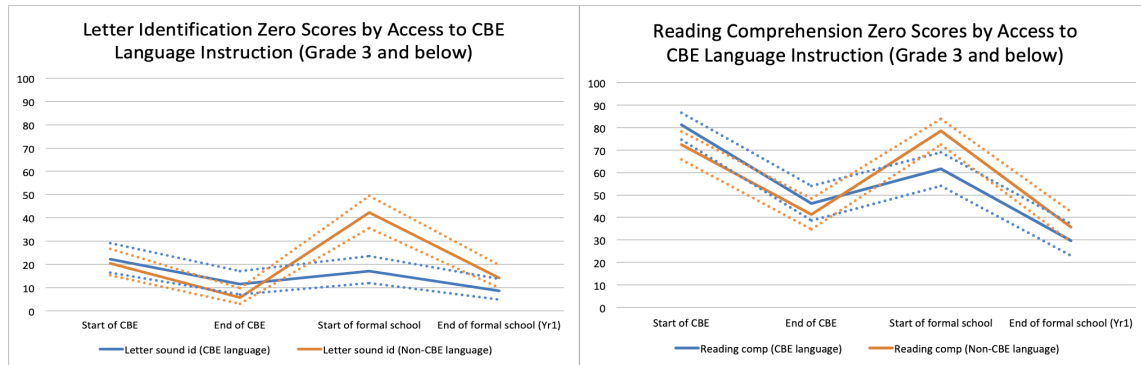
VARIABLES	Start to End of CBE		End of CBE to Start in Gov. School		Start to End of Year 1 in Gov. School	
	Letter sound identification (1)	Reading comprehension (2)	Letter sound identification (3)	Reading comprehension (4)	Letter sound identification (5)	Reading comprehension (6)
<u>Estimation sample</u>						
Initial difference	-0.01 (0.02)	0.03 (0.03)	0.04** (0.01)	0.03 (0.03)	-0.30*** (0.03)	-0.35*** (0.03)
Average change	-0.10*** (0.02)	-0.32*** (0.03)	0.37*** (0.02)	0.50*** (0.03)	-0.21*** (0.03)	-0.44*** (0.03)
Relative change	0.05* (0.02)	0.01 (0.04)	-0.33*** (0.03)	-0.37*** (0.04)	0.15*** (0.03)	0.19*** (0.04)
Observations	1058	1056	1058	1056	1058	1056
<u>Grade 3 and below</u>						
Initial difference	-0.01 (0.04)	0.15*** (0.04)	0.05 (0.03)	0.06 (0.05)	-0.27*** (0.04)	-0.18*** (0.04)
Average change	-0.14*** (0.03)	-0.32*** (0.04)	0.37*** (0.03)	0.38*** (0.04)	-0.30*** (0.03)	-0.42*** (0.04)
Relative change	0.06 (0.04)	-0.05 (0.06)	-0.31*** (0.05)	-0.22*** (0.06)	0.19*** (0.05)	0.09 (0.06)
Observations	469	468	469	468	469	468
<u>Grade 4 and above</u>						
Initial difference	0.01 (0.02)	-0.06 (0.04)	0.01 (0.01)	0.02 (0.04)	-0.34*** (0.04)	-0.48*** (0.04)
Average change	-0.06*** (0.02)	-0.32*** (0.04)	0.38*** (0.03)	0.65*** (0.04)	-0.10* (0.04)	-0.46*** (0.04)
Relative change	0.01 (0.02)	0.04 (0.05)	-0.34*** (0.04)	-0.53*** (0.05)	0.05 (0.05)	0.26*** (0.05)
Observations	589	588	589	588	589	588

Note: Robust standard errors in parentheses. Labels can be interpreted as follows: *Initial difference* refers to the difference between language same and language different student subgroups at the beginning of the time period in question; *Average change* refers to the average change in zero score proportions for each time period in question; *Relative change* represents the difference-in-difference parameter, i.e. the interaction term that denotes the relative difference between students who transitioned into the same and different language for each time period in question. Coefficients for gender, age, household size, access to home literacy materials, engagement in home learning

activities, work outside of home, non-attendance at school and relative wealth status are included as control. Asterisks *, **, *** indicate statistical significance at 5, 1 and 0.1% level.

Source: CBE Monitoring and Evaluation 2016-2018.

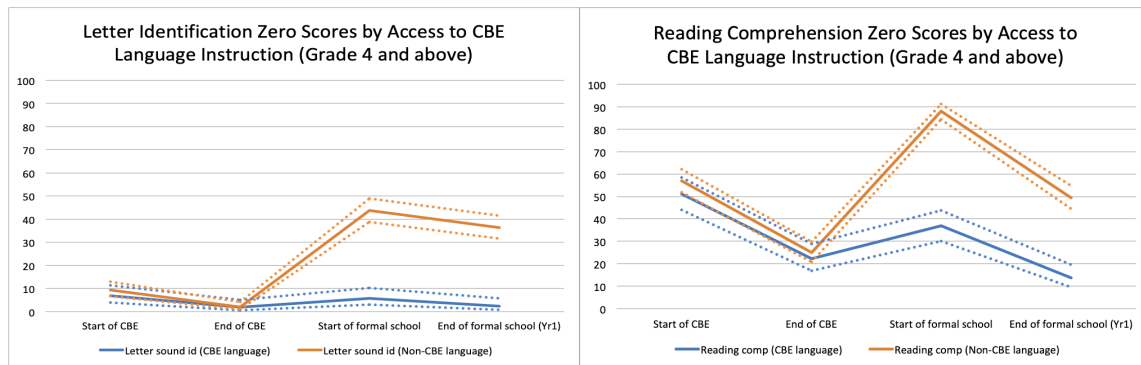
Figure 1: Zero scores for literacy subtasks by access to CBE language of instruction (Grade 3 and below)



*Dotted lines indicate 95% confidence intervals

Source: CBE Monitoring and Evaluation 2016-2018.

Figure 2: Zero scores for literacy subtasks by access to CBE language of instruction (Grade 4 and above)



*Dotted lines indicate 95% confidence intervals

Source: CBE Monitoring and Evaluation 2016-2018.